

REMARKS

Status of the Application

Claims 1-6, 9 and 13-21 are pending. Claims 1-4, 6, 9, 13-21 stand as rejected. Claim 5 stands as objected to.

Rejection under 35 U.S.C. § 103

Claims 1-4, 6, 9, 13-21 stand as rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 7,071,289 (“Sotzing”). This rejection is respectfully traversed. Applicants maintain traverse of this rejection based on remarks already made of record which will not be repeated in this paper, and in light of the following remarks.

To establish a *prima facie* case of obviousness, there must be some reason, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings. *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007). Moreover, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The reason to make the claimed modification, and a reasonable expectation of success, must be found elsewhere than in Applicants’ disclosure, such as in the prior art, the nature of the problem to be solved, or in the knowledge/understanding of the person of ordinary skill in the art. MPEP § 2143; *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Thus, the applicant’s disclosure may not be used as a blueprint from which to construct an obviousness rejection. Furthermore, according to MPEP § 2141.02, “[i]n determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious.” Applicants submit that the instant rejection does not meet these requirements.

Sotzing teaches that polymers formed from thiophene and substituted thiophene which possess relatively low band gaps (E_g) demonstrate measurable electrical conductivity, and may be referred to as “intrinsically conducting polymers”. Sotzing teaches that the band gap or E_g exhibited by a given polymer depends upon a variety of factors including the structure of the monomer making up the polymer. Col. 1, lines 18-31. Sotzing presents examples of poly(thiophenes) with E_g varying between eV and 0.85 eV. Sotzing further teaches that

modifying the polymers to maintain low band gap but increase solubility in a particular organic solvent may be achieved by: addition of side chains that are soluble in a particular organic solvent, modifying the conjugated backbone by including flexible spacer groups, and using charge compensating dopants. Col. 1, lines 32-43.

Sotzing is directed to compositions of matter formed from polymerized units of thieno[3,4-b]thiophene and, more particularly, to polymers comprising repeating units of the thienothiophene. Col. 2, lines 3-6. The preferred substituted thienothiophenes of the reference to be incorporated into polymers to form a copolymer have the formula:



wherein R=C₁ to C₁₂ primary, secondary or tertiary alkyl
35 group, phenyl, substituted phenyl, cyclohexyl, naphthalenic,
hydroxyl, alkyl ether, carboxylic acid, carboxylic ester and
a sulfonic acid.

Col. 2, lines 50-67. In Sotzing's definitions, "polymer" is defined as "a composition of matter having at least five polymerized units of thieno[3,4-b]thiophene. Thus the term, polymer, includes copolymers and oligomers having at least five polymerized units of thieno[3,4-b]thiophene." Col. 4, lines 1-5. Sotzing's preferred embodiment is a homopolymer referred to as poly(thieno[3,4-b]thiophene). Col. 5, lines 30-35. Sotzing teaches that the polymers disclosed in the reference, typically of intrinsically conducting polymers in general, are not soluble in water. Col. 1, lines 32-34. Therefore, a polymeric acid anion that is soluble in water can, per Sotzing, be used with his thienothiophenes because the conducting polymer is not soluble in water and will remain in dispersion. Col. 1, lines 53-62; see also Col. 6, lines 48-51 ("The compositions of

matter of this invention can be utilized as dispersions by combining a desired polymer (including copolymers and oligomers) with water, a mixture of a water-miscible organic solvent or an organic solvent.) The dispersed films may be dried by evaporation or heating.

Sotzing lists suitable p-dopants (protic acids, generally preferred) and n-dopants (which are basic, and include Na, K, Li and Ca, and also, I₂, PF₆, SbF₆ and FeCl₃). See Col. 7, lines 13-36. Sotzing also lists polyanions, including “nafion” (*sic.*) in Col. 9, lines 27-38. The molecular weights of the acids supplying the polyanions are preferably in the range of from 1,000 to 500,000. The list of suitable polyanions includes water-soluble polymeric acids (e.g., polystyrene sulfonic acid).

Applicants respectfully submit that Sotzing does not teach or fairly suggest the presence of a colloid-forming polymeric acid and a non-polymer acid anion dopant, nor does the reference teach or fairly suggest the polythiophenes of claim 3 and its dependent claims. The Office Action alleges that Sotzing’s thieno[3,4-b]thiophene fulfills the present claim requirement of a polythiophene. Applicants respectfully traverse this assertion. Sotzing requires at least five of these units to constitute a polymer, and prefers the homopolymer of poly(thieno[3,4-b]thiophene) while teaching, as noted, that structure of the monomer is a key factor in determining a desirably low band gap, E_g. In addition, Sotzing requires a p-dopant in addition to the polyanion acid, which is not required in the present claims. Claim 1 specifies an organic acid polymer, whereas Sotzing teaches protic acids for the p-dopant. These and other distinctions patentably define over Sotzing.

Accordingly, Applicants respectfully submit that the present claims are not obvious over the Sotzing and that this rejection should be withdrawn.

Allowable Subject Matter

The Office Action indicates that Claim 5 is drawn to allowable subject matter as the reference does not fairly teach or suggest the use of polyaniline.

Clarification Requested

Furthermore, Applicants respectfully submit that, also with respect to Claim 4, Sotzing does not teach or suggest the use of polypyrrole.

CONCLUSION

Applicants respectfully submit that a full and complete response to the outstanding Office Action has been submitted in this paper. Should the Examiner have questions about the application or the contents of this paper, the Examiner is invited to call the undersigned at the telephone number listed below.

Respectfully submitted,

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